

Knowledge creation and policy making: notes towards mapping climate change adaptation research capacities of universities in Victoria

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1. Purpose and background

The aim of the Government is understood to be to put itself in a position whereby it is able, in the most cost-effective way, to invest in and otherwise promote the knowledge base of governmental and other institutions in Victoria in the field of adaptation to climate change, including the establishment of adaptation research partnerships. Initially, Monash University, RMIT and the University of Melbourne are cooperating in an exercise to assess their respective capabilities.

This is not a straightforward information collection exercise.

- Definitions of institutional capabilities vary: they can be composites of the people in the universities, their information infrastructure, their stock and flow of knowledge or their knowledge linkages among stakeholders or all of these. Much knowledge is unrelated to place, so the concept of Victorian knowledge base will need

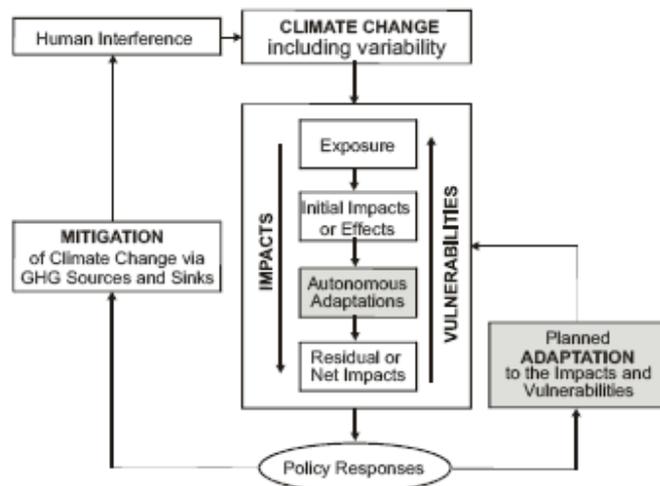


Figure 1: Adaptation in climate change (source Smit and Pilifosova)

definition, to include, in part, the global networks of partnered institutions.

- The relevance of knowledge and capacity to produce or disseminate it depends on an emerging ontology¹ of climate change and classification of a huge range of risks and adaptive responses that may be required. On one

¹ The study of the nature of being, reality, and substance, more specifically the conceptualisation of a domain of knowledge including through a controlled vocabulary that describes objects and the relations between them in a formal way, and has a grammar for using the vocabulary terms to express something meaningful within that domain of interest.

reading, almost any research capability might be relevant. The project will need a clear but flexible semantic structure to link knowledge to policy (see figure 1 for depiction of a conventional approach). Research is classified by research fields and socio-economic objectives (see table 1). Though global climate change adaptation measures constitute a third-level field (760101), it is difficult to see how any other field would be excluded. Many classifications of adaptation remain tentative, e.g. the Australian Greenhouse list of items that climate change adaptation 'might include', the UK's 'generic' classification (see table 2). An a priori DSE definition of, say, 10 'issue clusters' would be helpful.

Table 1: Research fields and socio-economic objectives

Research Fields, Courses and Disciplines (RFCD) Codes	Socio-Economic Objectives (SEO) Codes
Mathematical Sciences	Defence
Physical Sciences	Plant Production And Plant Primary Products
Chemical Sciences	Animal Production And Animal Primary Products
Earth Sciences	Mineral Resources (Excl. Energy)
Biological Sciences	Energy Resources
Information, Computing And Communication Sciences	Energy Supply
Engineering And Technology	Manufacturing
Agricultural, Veterinary And Environmental Sciences	Construction
Architecture, Urban Environment And Building	Transport
Medical And Health Sciences	Information And Communication Services
Education	Commercial Services And Tourism
Economics	Economic Framework
Commerce, Management, Tourism And Services	Health
Policy And Political Science	Education And Training
Studies In Human Society	Social Development And Community Services
Behavioural And Cognitive Sciences	Environmental Policy Frameworks And Other Aspects
Law, Justice And Law Enforcement	Environmental Management
Journalism, Librarianship And Curatorial Studies	Non-Oriented Research
The Arts	
Language And Culture	
History And Archaeology	
Philosophy And Religion	

- As Smit and Wandel² point out, particular adaptations are impossible to specify without a wider approach to vulnerability and broad adaptive capacity or resilience of the system or community for which the adaptation is intended (see figure 2). Thus, the task becomes one of enhancing adaptive capacity overall through strategy for managing risks and vulnerabilities rather than classifying particular adaptive responses.

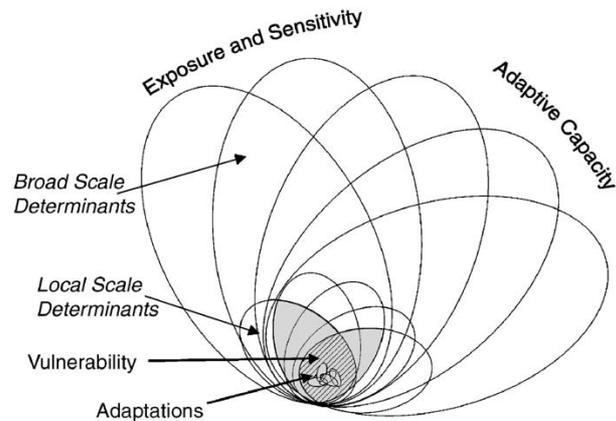


Figure 2: Nested hierarchy model of vulnerability (Source Smit and Wandel 2006: 286)

- Timescales of multi-generational length make for a greatly more inclusive set of data; the study has adopted a 100 year timeframe. Radical access to information and learning has broadened the definition of what is knowledge but made its claims more contestable, as is obvious in the climate change field itself.

- The relative amenability to policy intervention (i.e. cost-effectiveness, timeliness, technical and socio-political feasibility) associated with particular adaptation responses varies enormously. The bases for differentiating adaptations can include system type (natural/ human, public/ private), purposefulness (autonomous/ planned, passive/ active), timing (anticipatory/ responsive, proactive/ reactive), temporal scale (short-term/ long-term, tactical/ strategic), spatial scale (local, regional, State-wide, universal), function/ effects (retreat/ accommodate/ protect, prevent/ tolerate/ spread/ change/ restore), form (structural/ legal/ institutional, regulatory/ financial/ technological), and performance (cost-effectiveness/ efficiency, implementability/ equity)³.

For these reasons it is useful to test among study participants some propositions about the roles of universities – and by implication other such institutions – in knowledge development and, in turn, the roles of knowledge

² Smit B and J Wandel. 2006. 'Adaptation, adaptive capacity and vulnerability' *Global Environmental Change* 16, 6: 282–292. p286

³ After Smit, B. and Pilifosova, O. 2001, 'Adaptation to climate change in the context of sustainable development and equity'. In *Climate Change 2001: Impacts, Adaptation, and Vulnerability—Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge, UK: Cambridge University Press: 876-912.

in policy formation as it may be broadly defined⁴ to encompass the state⁵ in civil society, through which applied delivery mechanisms operate.

Table 2: Typology of adaptation strategies (Source UK 2003)

Adaptation type	Description/examples of application identified from UKCIP studies
Share loss	Insurance type strategies Use other new financial products that off-lay the risk Diversify
Bear loss	Where losses cannot be avoided: Certain species of montane fauna and flora (e.g. some arctic alpine flora may disappear from the UK) Loss of coastal areas to sea level rise and/or increased rates of coastal erosion
Prevent the effects: structural and technological (usually dependent on further investment)	Hard engineering solutions and implementation of improved design standards: Increase reservoir capacity Increase transfers of water Implement water efficiency schemes Scale up programmes of coastal protection Upgrade waste water and storm-water systems Build resilient housing Modify transport infrastructure Install or adopt crop irrigation measures Create wildlife corridors
Prevent the effects: legislative, regulatory and institutional	Find new ways of planning that cut across individual sectors and areas of responsibility (integration) Change traditional land use planning practices, to give greater weight to new factors such as flood risk and maintaining water supply-demand balance and security of supply Adopt new methods of dealing with uncertainty Provide more resources for estuarine and coastal flood defence Revise guidance notes for planners Factor climate change into criteria for site designation for biodiversity protection Amend design standards (e.g. building regulations) and enforce compliance
Avoid or exploit changes in risk: change location or other avoidance strategy	Migration of people away from high-risk areas Grow new agricultural crops Change location of new housing, water intensive industry, tourism Improved forecasting systems to give advance warning of climate hazards and impacts Contingency and disaster plans
Research	Use research to: Look at long-term issues Provide better knowledge of relationship between past and present variations in climate and the performance of environmental, social and economic systems (e.g. fluvial and coastal hydrology, drought tolerance and distribution of flora and fauna, economic impacts on key industrial sectors and regional economies), i.e. reduce uncertainty about the consequences of climate for receptors and decision-makers Improve short-term climate forecasting and hazard characterisation Produce higher resolution spatial and temporal data on future climate variability from model-based climate scenarios Provide more information on the frequency and magnitude of extreme events under climate change Find better regional indicators of climate change Develop more risk-based integrated climate change impact assessments
Education, behavioural	Lengthen planning timeframes (need to consider not just the next two to five years, but 2020s 2050s and beyond) Reduce uneven stakeholder awareness on climate change Increase public awareness to take individual action to deal with climate change (e.g. on health, home protection, flood awareness) and accept change to public policies (e.g. on coastal protection, landscape protection, biodiversity conservation)

⁴ e.g. as 'a plan or course of action, as of a government, political party, or business, intended to influence and determine decisions, actions, and other matters' – World Bank

⁵ Note that the State of Victoria, capitalised, is contrasted with the role of the state more broadly.

2. Universities and knowledge

The trite observation that universities are 'knowledge institutions' belies the many roles that universities play in the creation, transmission and use of knowledge. A workable taxonomy of these modes is a necessary step towards mapping university capacities to produce knowledge. A number of approaches are well known and could be considered here:

'Mode I' and 'mode II' knowledge, popularised by Gibbons et al in 1994, makes a distinction between the production of knowledge in a traditional manner – e.g. curiosity-driven, investigator-initiated and discipline-based – and the production of knowledge in a more recently-evolved manner – e.g. utilitarian, problem-focused research produced by teams across disciplines. The mode of production of knowledge undertaken may be useful in considering university capabilities, but it might be irrelevant to the applicability of outcomes to policy, particularly over the timeframes under consideration for adaptive responses to climate change. Our knowledge comprises many fundamental findings that were discovered in the course of practical research, and many applications originally unforeseen by their solitary scientific inventors.

Boyer scholarships: Some universities in Victoria consider their academic activities within the four Boyer 'scholarships,' of teaching, application, integration (or synthesis), and discovery. According to Boyer (1990:25),

What we urgently need today is a more inclusive view of what it means to be a scholar – a recognition that knowledge is acquired through research, through synthesis, through practice, and through teaching.

It is possible to envisage a review of university capabilities through these categories, offering a wider view of what universities are providing to policy arenas than conventional research results. For example all the universities support significant practices of professional involvement in policy, through consultancy, public affairs, media, and the interpenetration of students and staff through government agencies and back into the universities.

Institutional engagement: The substantial literature on university engagement with their communities or with their stakeholders gives us pointers to the different means of university research engagement with policy. For example landmark studies of research universities in the Boston region and the roles of universities in London's economy is currently being replicated in Melbourne and should provide useful information for this exercise. Categories considered are:

- contributions to the development of the region's human capital, its productivity and earnings e.g. knowledge and skills built up through education and training programs, students, alumni and lifelong learning activities;
- the role of university research and innovation e.g. through research drawing into the region significant research funding, expenditure in the

metropolitan region, collaboration between universities and industry in research and innovation, attraction of investment from domestic and international entities;

- the universities' role in new business development e.g. through the development of new products and processes, technology transfer into emerging and established industries, university staff and student involvement in new ventures, graduates as a source of entrepreneurial vitality, innovation and the development of research precincts, business parks, commercial research and office facilities;
- the role of universities as employers e.g. through combined payrolls, the development of workforce skills, indirect job multipliers and their wider roles in national and regional economic development and stability;
- expenditure on goods and services in the region, local contractors and construction and the creation of campus environments that attract students, scholars and others;
- student spending on housing, food, entertainment, transportation etc, visitor spending on conferences, professional education, sporting events, graduations etc;
- university assistance to community economic development in the Melbourne metropolitan region; e.g. assistance to schools, environmental protection, community and service organisations and the professions.
- community service e.g. university participation in community service organisations, use of campuses by community groups, involvement in humanitarian campaigns or programs to support social access and participation;
- knowledge and information e.g. access to libraries and information resources, conferences, public lectures, publishing;
- arts and culture including major events e.g. university galleries and exhibitions, performing arts events and engagements, participation in major festivals;
- architecture and urban precinct developments e.g. open campuses, planning and architectural contributions, environmental protection and improvement;
- international activities that contribute to the region e.g. joint offices with cities overseas, provision of skills for international projects, joint marketing and promotion of Melbourne for international research and student programs, volunteer programs sourced from Melbourne;
- sporting services, facilities and events both elite and popular;
- marketing and promotion e.g. joint promotions, contributions to city reputation and brand, coordinated international student marketing around Melbourne's identity and lifestyle (See Appleseed 2003, also OECD 1997a and 1997b, Berry 2003, Garlick and Pryor 2002, GLA Economics 2004,

Goddard and Chatterton 1999, Morgan 1997, Pennsylvania Economy League Eastern Division 2000 and Winter, Wiseman and Muirhead 2005).

Of course, many of these stray from the knowledge base sought in this project, but the results may give some dimensions to the scale of university engagement with climate change adaptation already.

In conclusion, the modes of knowledge creation and dissemination can be provisionally classified as

1. creation of new knowledge
2. codification of tacit, indigenous and other forms of knowledge hitherto not recognised
3. adaptation and transformation of knowledge to practical settings through applied research and other practices
4. transmission of knowledge through education and training programs
5. assembly and mobilisation of knowledge resources not necessarily housed in the State e.g. through libraries and research organisations
6. access to such knowledge and information resources globally through people, groups, institutions and infrastructure located in or linked to Victoria.

3. Policy development

The construction of policy environments to make best use of knowledge in policy development is perhaps just as nebulous as that of climate change adaptation, but it has attracted less attention and fewer resources. The UK government's Office of the e-Envoy, known as Knowledge Enhanced Government (KEG) sought to provide a holistic view of knowledge management and recommendations for activity in policy development around ten key areas of activity. These broadly correspond with applied policy delivery mechanisms.

- Knowledge capture - policies and processes for identifying and capturing explicit and tacit knowledge.
- Knowledge transfer - policies and processes for transferring knowledge among and between its various sources and forms.
- Knowledge retention - policies and processes for retaining organisational knowledge, especially during periods of organisational change.
- Content management - policies and processes for efficiently managing the organisational knowledge base.
- Knowledge capital - policies and processes for measuring and developing the government's human and social capital.
- Enabling communities - policies and processes for promoting and supporting knowledge-based community working across and between departments.

- Supporting a knowledge culture - policies and processes to create the necessary cultural changes to embed the knowledge management ethos into working practices.
- Knowledge partnerships - policies and processes for promoting and supporting knowledge partnerships between central government and key partners such as local government, departmental agencies, non-departmental public bodies, voluntary and community organizations etc.
- Supporting key business activities - policies and processes to support key business activities in government such as project management, the legislative process, delivery monitoring etc.
- Knowledge benchmarking - policies and processes for benchmarking current knowledge management capabilities and practices against UK and international best practice, and for improving performance (UK National Health Service 2006).

Recent approaches to governance emphasise the character of the state, embedded in civil society and moving towards pluralist and extra-state structures and processes of governance. In the field of climate change adaptation there is no doubt that civil society stakeholders will play a leading role. Therefore the ways in which government use knowledge for policy development will be inseparable from the ways that stakeholders at other levels of government, in business, non-governmental and community-based organisations look for and apply knowledge to policy issues.

In conclusion, a simple model of policy stakeholding and governance processes can provide a starting point for a typology of sectors that use – and generate – knowledge relevant to climate adaptation policy:

- Dedicated climate change adaptation groups within government agencies themselves, a growing commitment
- State government departments and whole-of-government processes of policy development and knowledge application
- Commonwealth and local governments, as well as other States and Territories
- International and global stakeholders relevant
- Business and industry
- Non-governmental and community-based organisations
- People acting as individuals.

Whether climate change adaptation research effectively provides knowledge into fertile ground with these and other stakeholders depends critically on proximate factors not overall abstract considerations.

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